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CLAIMS

1. A beam shearing system comprising:

an entrance slit structure having an entrance slit extending in a first direction for receiving a beam of light having a photon flux within a predetermined spectral pass band;

a beam splitter aligned at an angle to the first direction so that the received beam of light is split into two separate beams; and

a reflective subsystem having a plurality of reflective surfaces defining separate light paths of equal optical path length for the two separate beams, the reflective surfaces arranged such that when the two beams emerge from the beam shearing system they contain more than 50 percent of the said photon flux and the chief rays of the two separate beams are substantially parallel to each other.

2. The beam shearing system in claim 1 wherein:

said two beams emerging from the beam shearing system contain substantially all of the light entering the system through the entrance slit.

3. The beam shearing system in claim 1 wherein:

said two light paths being of substantially equal optical path length and causing the wave fronts of the

two separate beams to remain substantially in phase relative to one another.

4. The beam shearing system in claim 1 wherein:

said plurality of reflective surfaces are further arranged so that the separate beams of light are of substantially equal intensity, when they emerge from the beam shearing system.

5. The beam shearing system in claim 1 wherein:

the reflective subsystem comprises a plurality of bodies with a beam splitter therebetween; and

the entrance and exit surfaces of the plurality of bodies are substantially perpendicular to the chief ray of the received beam of light.

6. A spectral resolving system comprising:

an entrance slit structure having an entrance slit extending in a first direction for receiving a beam of light having a photon flux within a predetermined spectral pass band;

a beam shearing system including:

a beam splitter aligned at an angle to the first direction so that the received beam of light is split into two separate beams;

a reflective subsystem having a plurality of reflective surfaces defining separate light paths of equal optical path length for the two separate beams, the reflective surfaces arranged such that when the two beams emerge from the beam shearing system they contain more than 50 percent of the said photon flux and the chief rays of the two separate beams are substantially parallel to each other; and

an optical system focusing the said two separate beams of light emerging from the said beam shearing system onto an exit pupil.

7. The spectral resolving system of claim 6 wherein:

said optical system also focuses the said separate beams of light emerging from the said beam shearing system to create an image.

8. The spectral resolving system of claim 7 wherein:

said optical system has an optical axis;

said exit pupil is located in one of the group consisting of a tangential plane and a sagiital plane relative to the said beam shearing system;

said image is located in the other of the group consisting of a tangential plane and a sagiital plane relative to the said beam shearing system; and

the exit pupil and the image are located at substantially the same position along the optical axis.

9. The spectral resolving system of claim 6 wherein:

the optical system is telecentric in the said exit pupil plane.

10. The spectral resolving system of claim 6 wherein:

the optical system is anamorphic.

11. The spectral resolving system of claim 6 wherein:

the said optical system cancels aberrations when it recombines the two beams of light that emerge from the beam shearing system.

12. A static interferometer comprising:

fore-optics for collecting light and focusing it into a beam;

a spectral resolving system comprising:

an entrance slit structure having an entrance slit extending in a first direction for receiving a beam of light having a photon flux within a predetermined spectral pass band;

a beam shearing system including:

a beam splitter aligned at an angle to the first direction so that the received beam of light is split into two separate beams;

a reflective subsystem having a plurality of reflective surfaces defining separate light paths of equal optical path length for the two separate beams, the reflective surfaces arranged such that when the two beams emerge from the beam shearing system they contain more than 50 percent of the said photon flux and the chief rays of the two separate beams are substantially parallel to each other; and

an optical system focusing the said two separate beams of light emerging from the said beam shearing system onto an exit pupil; and

a detector located at the exit pupil.

13. The static interferometer in claim 12 wherein:

the detector comprises a detector array, read out electronics and a data processing system.

14. The static interferometer in claim 13 wherein:

the detector array records the intensity of the radiation incident on its pixels;

the read out electronics digitizes the intensity measurements made by the detector array and transfers them to the data processing system; and

the data processing system manipulates the digitized measurements to obtain information about the spectrum of said incident radiation.

15. The static interferometer in claim 14 wherein:

the data processing system performs Fast Fourier Transforms on the digitized measurements to obtain the spectral composition of the incident radiation;

16. The static interferometer in claim 14 wherein:

the data processing system convolves the digitized measurements with digital filters to detect the presence or absence in the spectrum of the incident radiation of frequencies of radiation characteristically emitted or absorbed by particular substances.

17. The static interferometer in claim 12 wherein:

a single sided interferogram is created at said exit pupil.

18. The static interferometer in claim 17 wherein:

the fore-optics focus the collected light in such a way that the chief ray of the said collected light describes paths through the said spectral resolving system, which recombine on the said exit pupil at the edge of the said detector array; and

said paths of the chief ray have substantially the same optical path length.

19. The static interferometer in claim 18 wherein:

said fore-optics have a shifted pupil design.

20. The static interferometer in claim 12 wherein:

said fore-optics are telecentric.

21. The static interferometer of claim 12 wherein:

said optical system also focuses the said separate beams of light emerging from the said beam shearing system to create an image.

22. The static interferometer of claim 21 wherein:

said optical system has an optical axis;

said exit pupil is located in one of the group consisting of a tangential plane and a sagiital plane relative to the said beam shearing system;

said image is located in the other of the group consisting of a tangential plane and a sagiital plane relative to the said beam shearing system; and

the exit pupil and the image are located at substantially the same position along the optical axis.

23. A beam shearing system comprising:

an entrance slit structure having an entrance slit extending in a first direction for receiving a beam of light having a photon flux within a predetermined spectral pass band;

a beam splitter aligned at an angle to the first direction so that the received beam of light is split into two separate beams;

a reflective subsystem having a plurality of reflective surfaces defining separate light paths of equal optical path length for the two separate beams, the reflective surfaces arranged such that one of the separate beams undergoes one reflection and the other of the separate beams undergoes three reflections and

that when the two beams emerge from the beam shearing system they contain more than 50 percent of the said photon flux.

24. A static interferometer comprising:

fore-optics for collecting light and collimating into a beam, the fore-optics possessing an exit pupil;

a spectral resolving system comprising:

an entrance slit structure having an entrance slit extending in a first direction for receiving a beam of light having a photon flux within a predetermined spectral pass band;

a beam shearing system comprising:

a beam splitter aligned at an angle to the first direction so that the received beam of light is split into two separate beams;

a reflective subsystem having a plurality of reflective surfaces defining separate light paths of equal optical path length for the two separate beams, the reflective surfaces arranged such that one of the separate beams undergoes one reflection and the other of the separate beams undergoes three reflections and that when the two beams emerge from the beam

shearing system they contain more than 50 percent of the said photon flux; and

a detector located at said exit pupil where the two beams emerging from the beam shearing system converge.

25. The static interferometer in claim 24 wherein:

the detector comprises a detector array, read out electronics and a data processing system.

26. The static interferometer in claim 25 wherein:

the detector array records the intensity of the radiation incident on its pixels;

the read out electronics digitizes the intensity measurements made by the detector array and transfers them to the data processing system; and

the data processing system manipulates the digitized measurements to obtain information about the spectrum of said incident radiation.

27. The static interferometer in claim 26 wherein:

the data processing system performs Fast Fourier Transforms on the digitized measurements to obtain the spectral composition of the incident radiation;

28. The static interferometer in claim 27 wherein:

the data processing system convolves the digitized measurements with digital filters to detect the presence or absence in the spectrum of the incident radiation of frequencies of radiation characteristically emitted or absorbed by particular substances.

29. The static interferometer in claim 24 which further comprises:

an anamorphic optical system possessing an optical axis;

the exit pupil being perpendicular to the optical axis;

the optical system focusing the two beams emerging from the beam shearing system to create an image; and

the image being perpendicular to the exit pupil and perpendicular to the optical axis.